WHAT IS CLAIMED IS:

1. An isolated polynucleotide molecule encoding a polypeptide comprising all or a portion of a human KCNQ5 protein.

2. The polynucleotide molecule according to claim 1, wherein the human KCNQ5 protein comprises the amino acid sequence set forth in SEQ ID NO:2.

3. The polynucleotide molecule according to claim 1, wherein the molecule is selected from the group consisting of (a) all or a portion of a nucleic acid sequence set forth in SEQ ID NO:1; (b) the complement of (a); and (c) variations of (a) due to degeneracy in the genetic code.

4. A vector comprising the polynucleotide molecule according to claim 1.

5. A vector comprising the polynucleotide molecule according to claim 2.

6. A vector comprising the polynucleotide molecule according to claim 3.

7. A host cell comprising the vector according to claim 4.

8. A host cell comprising the vector according to claim 5.

9. A host cell comprising the vector according to claim 6.

10. The host cell according to claim 7, wherein said cell is prokaryotic or eukaryotic.

11. The host cell according to claim 8, wherein said cell is prokaryotic or eukaryotic.

12. The host cell according to claim 9, wherein said cell is prokaryotic or eukaryotic.

13. An isolated nucleic acid molecule having at least 80% sequence identity to the nucleotide sequence as shown in SEQ ID NO:1.

14. An isolated nucleic acid molecule encoding a human KCNQ5 potassium channel, wherein said nucleic acid molecule hybridizes under moderate stringency conditions to a nucleic acid encoding the amino acid

sequence set forth in SEQ ID NO:2.

15. An isolated nucleic acid molecule encoding a human KCNQ5 potassium channel polypeptide, wherein said nucleic acid molecule hybridizes under high stringency conditions to a nuclei acid encoding the amino acid sequence set forth in SEQ ID NO:2.

16. An isolated nucleic acid molecule encoding a human KCNQ5 potassium channel polypeptide and having a contiguous nucleotide sequence that encodes the amino acid sequence set forth in SEQ ID NO:2.

17. A vector comprising the nucleic acid molecule according to claim 13.

18. A vector comprising the nucleic acid molecule according to claim 14.

19. A vector comprising the nucleic acid molecule according to claim 15.

20. A vector comprising the nucleic acid molecule according to claim 16.

21. A cell comprising the vector according to claim 17.

22. A cell comprising the vector according to claim 18.

23. A cell comprising the vector according to claim 19.

24. A cell comprising the vector according to claim 20.

25. An isolated KCNQ5 polypeptide comprising all or a portion of the amino acid sequence set forth in SEQ ID NO:2.

26. An isolated KCNQ5 polypeptide encoded by the polynucleotide molecule according to any of claims 1 to 3.

27. An isolated KCNQ5 polypeptide encoded by the nucleic acid molecule according to any of claims 13 to 16.

28. A method of identifying a compound that modulates the biological activity of a KCNQ5 potassium channel polypeptide, comprising:

(a) combining a candidate modulator compound with a KCNQ5 potassium channel polypeptide having the sequence set forth in SEQ ID NO:2; and

(b) measuring an effect of the candidate modulator compound on the activity of the KCNQ5 potassium channel polypeptide.

29. A method of identifying a compound that modulates the biological activity of a KCNQ5 potassium channel polypeptide, comprising:

(a) combining a candidate modulator compound with a host cell expressing a KCNQ5 potassium channel polypeptide having the sequence as set forth in SEQ ID NO:2; and

(b) measuring an effect of the candidate modulator compound on the activity of the expressed KCNQ5 potassium channel polypeptide.

30. A method of identifying a compound that modulates the biological activity of a KCNQ5 potassium channel polypeptide, comprising:

(a) combining a candidate modulator compound with a host cell containing a vector according to any of claims 4 to 6, or claims 17 to 20, wherein a KCNQ5 potassium channel polypeptide is expressed by the cell; and

(b) measuring an effect of the candidate modulator compound on the activity of the expressed KCNQ5 potassium channel polypeptide.

31. A method of screening for a compound that is capable of modulating the biological activity of a KCNQ5 polypeptide, comprising the steps of:

(a) providing a host cell according to any of claims 7 to 9 and 21 to 24;

(b) determining the biological activity of the KCNQ5 polypeptide in the absence of a modulator compound;

(c) contacting the cell with the modulator compound; and

(d) determining the biological activity of the KCNQ5 polypeptide in the presence of the modulator compound; wherein a difference between the activity of the KCNQ5 polypeptide in the presence of the modulator compound and in the absence of the modulator compound indicates a modulating effect of the compound.

32. A compound that modulates the biological activity of human

KCNQ5 potassium channel polypeptide as identified by the method according to claim 28.

33. A compound that modulates the biological activity of human KCNQ5 potassium channel polypeptide as identified by the method according to claim 29.

34. A compound that modulates the biological activity of human KCNQ5 potassium channel polypeptide as identified by the method according to claim 30.

35. A compound that modulates the biological activity of human KCNQ5 potassium channel polypeptide as identified by the method according to claim 31.

36. An antisense nucleic acid molecule which binds to the polynucleotide molecule according to claim 1.

37. An antisense nucleic acid molecule which binds to the polynucleotide molecule according to claim 2.

38. An antisense nucleic acid molecule which binds to the polynucleotide molecule according to claim 3.

39. An antisense nucleic acid molecule which binds to the nucleic acid molecule according to any of claims 13 to 16.

40. A pharmaceutical composition comprising the polypeptide according to claim 25 and a physiologically acceptable carrier, excipient, or diluent.

41. A pharmaceutical composition comprising the polypeptide according to claim 26 and a physiologically acceptable carrier, excipient, or diluent.

42. A pharmaceutical composition comprising the polypeptide according to claim 27 and a physiologically acceptable carrier, excipient, or diluent.

43. A method for the production of a pharmaceutical composition comprising the steps of the method according to claim 28 and further including step (c): formulating the compound that is capable of modulating

the biological activity of the KCNQ5 polypeptide in a pharmaceutically acceptable form.

44. A method for the production of a pharmaceutical composition comprising the steps of the method according to claim 29 and further including step (c): formulating the compound that is capable of modulating the biological activity of the KCNQ5 polypeptide in a pharmaceutically acceptable form.

45. A method for the production of a pharmaceutical composition comprising the steps of the method according to claim 30 and further including step (c): formulating the compound that is capable of modulating the biological activity of the KCNQ5 polypeptide in a pharmaceutically acceptable form.

46. A method for the production of a pharmaceutical composition comprising the steps of the method according to claim 31 and further including step (e): formulating the compound that is capable of modulating the biological activity of the KCNQ5 polypeptide in a pharmaceutically acceptable form.

47. The method according to claim 43, wherein the pharmaceutical composition is for the treatment of acute and chronic pain, migraine headache, acute stroke, dementia, trauma, epilepsy, seizure, amyelotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's Disease, anxiety disorders, depression, bipolar disorders, sleep disorders, addiction, eating disorders, ataxia, myokymia, Alzheimer's disease, age-associated memory loss, learning deficiencies, cognitive disorders, and motor neuron diseases.

48. The method according to claim 44, wherein the pharmaceutical composition is for the treatment of acute and chronic pain, migraine headache, acute stroke, dementia, trauma, epilepsy, seizure, amyelotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's Disease, anxiety disorders, depression, bipolar disorders, sleep disorders, addiction, eating disorders, ataxia, myokymia, Alzheimer's disease, age-associated memory loss, learning deficiencies, cognitive disorders, and motor neuron diseases.

49. The method according to claim 45, wherein the pharmaceutical composition is for the treatment of acute and chronic pain, migraine headache, acute stroke, dementia, trauma, epilepsy, seizure, amyelotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's Disease, anxiety disorders, depression, bipolar disorders, sleep disorders, addiction, eating disorders, ataxia, myokymia, Alzheimer's disease, age-associated memory loss, learning deficiencies, cognitive disorders, and motor neuron diseases.

50. The method according to claim 46, wherein the pharmaceutical composition is for the treatment of acute and chronic pain, migraine headache, acute stroke, dementia, trauma, epilepsy, seizure, amyelotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's Disease, anxiety disorders, depression, bipolar disorders, sleep disorders, addiction, eating disorders, ataxia, myokymia, Alzheimer's disease, age-associated memory loss, learning deficiencies, and motor neuron diseases.

51. An antibody specific for the KCNQ5 polypeptide according to claim 25.

52. An antibody specific for the KCNQ5 polypeptide according to claim 26.

53. An antibody specific for the KCNQ5 polypeptide according to claim 27.

54. The antibody according to claim 51, wherein the antibody is a monoclonal antibody.

55. The antibody according to claim 52, wherein the antibody is a monoclonal antibody.

56. The antibody according to claim 53, wherein the antibody is a monoclonal antibody.

57. The antibody according to claim 51 or claim 54, wherein said antibody is directed toward a portion of the KCNQ5 polypeptide comprising a peptide having a sequence selected from the group consisting of SEQ ID NO:5-21, or a combination thereof.

58. An isolated polynucleotide molecule selected from the group

consisting of an allelic variant, an alternative splice exon variant, and a chimeric fusion channel of the polypeptide encoded by the polynucleotide according to any of claims 1 to 3.

59. An isolated polynucleotide molecule selected from the group consisting of an allelic variant, an alternative splice exon variant, and a chimeric fusion channel of the polypeptide encoded by the nucleic acid molecule according to any of claims 13 to 16.

60. A vector according to any of claims 4-6 or 17-20, selected from the group consisting of viral, prokaryotic and eukaryotic vectors.

61. A method for screening a plurality of compounds to assess specific binding affinity with a KCNQ5 potassium channel polypeptide, or a bindable portion thereof, comprising:

(a) providing a plurality of test compounds;

(b) combining the KCNQ5 polypeptide, or a bindable fragment thereof, with each of the plurality of compounds for a time sufficient to allow binding under suitable conditions; and

(c) detecting binding of the KCNQ5 polypeptide to each of the plurality of test compounds, thereby identifying the compounds that specifically bind to the KCNQ5 polypeptide.

62. An isolated nucleic acid molecule, wherein the sequence of said nucleic acid molecule is identical to the sequence in ATCC Deposit No. PTA-1924 (human KCNQ5).

63. A method of treating a disease or disorder selected from the group consisting of acute and chronic pain, migraine headaches, acute stroke, dementia, vascular dementia, trauma, epilepsy, seizures, asthma, amyelotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's Disease, neurophysiological disorders, neuropsychological disorders, anxiety disorders, depression, bipolar disorders, sleep disorders, addiction, eating disorders, ataxia, myokymia, Alzheimer's disease, age-associated memory loss, cognitive disorders, learning deficiencies, neuronal cell death, and brain tumors and motor neuron diseases, comprising providing the

KCNQ nucleic acid molecule of claim 1, claim 2, or claim 3 in an amount effective to treat the disease or disorder in a physiologically acceptable carrier or excipient.

64. A method of screening for or detecting candidate compounds capable of binding to human KCNQ5 potassium channel polypeptide, comprising:

a) contacting a test compound with a purified KCNQ5 polypeptide according to claim 25; and

b) selecting as candidate compounds those test compounds that bind to the polypeptide.

65. A method of screening for or detecting candidate compounds capable of binding to human KCNQ5 potassium channel polypeptide, comprising:

a) contacting a test compound with a purified KCNQ5 polypeptide according to claim 26; and

b) selecting as candidate compounds those test compounds that bind to the polypeptide.

66. A method of screening for or detecting candidate compounds capable of binding to human KCNQ5 potassium channel polypeptide, comprising:

a) contacting a test compound with a purified KCNQ5 polypeptide according to claim 27; and

b) selecting as candidate compounds those test compounds that bind to the polypeptide.

67. The method according to claim 64, wherein the polypeptide is immobilized onto a solid support.

68. The method according to claim 65, wherein the polypeptide is immobilized onto a solid support.

69. The method according to claim 66, wherein the polypeptide is immobilized onto a solid support.

70. The method according to claim 64, wherein the candidate compounds are immobilized onto a support.

71. The method according to claim 65, wherein the candidate compounds are immobilized onto a support.

72. The method according to claim 66, wherein the candidate compounds are immobilized onto a support.

73. The method according to claim 64, wherein the method comprises high throughput screening technology.

74. The method according to claim 65, wherein the method comprises high throughput screening technology.

75. The method according to claim 66, wherein the method comprises high throughput screening technology.

76. The method according to claim 64, wherein the candidate compounds are small molecules, therapeutics, or drugs.

77. The method according to claim 65, wherein the candidate compounds are small molecules, therapeutics, or drugs.

78. The method according to claim 66, wherein the candidate compounds are small molecules, therapeutics, or drugs.